

Creating Games to Get Students!

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Abstract

The Computer Information and Technology Department (CIT) program of Purdue University is offered at our regional campus in Columbus, Indiana. Like many programs throughout the country, we face issues in recruiting new students. Over the last seven to eight years, we have faced declining enrollment, even as our main campus at West Lafayette saw strong gains. The cause could be a variety of issues, such as cost of college, continued fear of outsourcing in entry level jobs, belief that students can just get certifications to get jobs, increased competition from online programs, to name a few. At our site in Columbus, we face those challenges as well as additional challenges specific to our campus that will be addressed in this paper. In an effort to reverse the enrollment trends and build up awareness of Purdue in the area and CIT in particular, we have developed several exciting camps. One camp is an Animation Camp discussed in a previous conference submission. However, we have changed the focus of that camp slightly and added a new camp for high school students on game development. In this paper we will discuss the ideas behind the development of the camps and specifically focus on the efforts to create a game development camp.

Introduction

Last summer for the first time at the Purdue University campus in Columbus, Indiana, we offered two exciting summer camps for local middle school and high school students. The high school camp was new and the middle school camp was revised to focus strictly on middle school students. Both of these camps were developed by faculty from the Computer and Information Technology (CIT) department of Purdue University at our Columbus site. Middle school children were able to create animated videos while attending a four-day computer animation camp, and the high school students were able to create computer games in a five-day game development camp. The goal of these camps and other activities is to raise awareness about our CIT program in Columbus and, in the long run, hopefully add new students to our CIT program. In this paper we are going to give you background on why we developed

the camps, on how the camps, especially the new game development camp, were developed, and, finally, about our future plans for the camps.

Background

First, a little background on Purdue's College of Technology and our program in Columbus. Purdue University College of Technology (COT) has a statewide system that has programs throughout the state of Indiana. One of the goals is to make technology programs available throughout the state of Indiana. In Columbus we have the Organizational Leadership and Supervision (OLS), Industrial Technology (IT), Mechanical Engineering and Technology (MET) and Computer and Information Technology (CIT). At each statewide site the College of Technology partners with a local college to provide non-major related classes such as Mathematics, Science, English, etc. In Columbus the partner is Indiana University Purdue University Columbus (IUPUC). The Purdue in the name is NOT the College of Technology but instead Science programs from IUPUC's main campus in Indianapolis. This causes great confusion in the community and even with students on campus. Purdue College of Technology has its' own admissions, programs and recruiting activities in the community. This constant "identity crisis" is problematic in recruiting new students. Besides the identity issue we have also seen increasing competition in recruiting students from other universities in southeast Indiana and online programs as well. Our program has seen decreasing number of students over the last twelve to fourteen years. For the early to mid-2000s our program was like many other computer science and computer technology programs that saw significant drops in enrollment with the bursting of the dot-com bubble and outsourcing fears. The Columbus CIT enrollment seemed to stabilize but since 2010 the enrollment has dropped by approximately 65%. This is not just an issue for our site in fact our CIT site in Anderson, Indiana closed because of low enrollments. What is interesting over that same time period our CIT program at our main campus has seen total enrollment increase 50%.

CIT Recruitment Efforts

Summer Camps

Over the years we have tried recruiting as many universities do, with multiple approaches advertising in local and school newspapers, magazines, billboards and included many face to face activities for parents and students. Many of the activities focused on high school juniors and seniors. In 2010 while brainstorming ideas for CIT recruiting we came up with the idea of offering a computer camp based among other things a successful summer camp Mechanical Engineering Technology was doing with LEGOs. In 2011 we had a sold out Computer Animation Camp that had students from middle school to high school attending. In ensuing years the camp continued to be well attended and had a good percentage of girls attending. Generally 30-40% of the campers were female, which was much higher than the comparable LEGO camp. Recruiting women in our program like many other computer related programs is always a struggle so the camp definitely had promise.

Strategy

A problem we had with the Computer Animation camp was that the age range at times was wide. One year we had 4th to 10th graders participating, even though the age range was specifically stated on the registration site. As one might imagine, it was difficult to make the camp challenging, exciting and fun

for such a large age range. A second issue was actually based on the success of the camp. We had parents and campers asking for an advanced camp to follow up.

What we decided to do, instead of having a second computer animation camp, was to create a game development camp and have the animation camp focus on incoming 6th – 8th graders and have the game development camp focus on 9th grade and up. This would give our CIT program a chance to build a relationship with local students over several years and give students a chance to try out different activities. Another goal was to market this as a Purdue camp and differentiate ourselves from IUPUC. The camps would be developed and marketed by Purdue and registration would take place through the Purdue University website.

Computer Animation Camp

The Columbus Computer Animation camp started in 2011 and has been at or near capacity each year of its existence. The capacity is generally set at 24, which is the size of the computer lab utilized for the camp. The format of the camp was a 4-day camp that ran 3 hours a day. Over the four days students learned how to create animations using Alice, a piece of software developed at Carnegie Mellon. According to the Alice website (2015), “Alice is an innovative 3D programming environment that makes it easy to create an animation for telling a story, playing an interactive game, or a video to share on the web. Alice is a teaching tool for introductory computing.” One of the great things about Alice is that it has several versions and has been used from elementary to college level students. Another advantage to using Alice is, the software is free, so campers could easily go home and download the software, which is what many of the campers did. Finally, the Alice website had an abundance of free teaching materials, demonstrations and sample programs. Besides t-shirts, snacks and prizes, the camp culminates with a contest attended by campers, parents and staff to create an animated commercial, fully designed and developed by the campers with prizes awarded to all participants.

With the addition of the game development camp, the target audience narrowed to incoming 6th–9th graders. Not a lot of changes were required, and the big benefit was that the campers were much closer aligned in ages than in previous versions of the camp.

Game Development Camp

Introduction to Game Development Camp

The new Columbus Game Development Camp is for incoming 10th through 12th graders. Students of all skill levels are welcome. The campers use Unity and Autodesk Maya software to learn game development skills to create a 3D virtual world and implement movement and actions of a player character. Unity is a popular game engine developed by Unity Technologies, and Autodesk Maya is a tool for 3D modeling and animation providing a seamless workflow transition to Unity. (We will discuss the software tools aspect of the camp in more detail later in the paper.) Included in the registration cost are t-shirts, daily snacks, and prizes for all attendees. This is a 5-day camp that ran 4 hours a day. In the camp proposal, the following objectives were set forth.

Upon completion of the camp, the students should be able to:

1. Develop a game concept

2. Create simple 3D objects and animations using Autodesk Maya
3. Import a simple animated character into Unity
4. Create a simple game level with terrain and prefabricated objects using Unity
5. Implement basic movement and simple actions of a player character in the 3D virtual world

In order to help the students achieve those goals, the following topics were covered over the course of the first four days of the camp.

1. Basics of Game Design
2. Introduction to 3D Graphic Art and Animation in Autodesk Maya
3. Import of 3D Graphic Art and Animation into Unity
4. Introduction to Level Design: Terrain
5. Introduction to Game Programming

Development of Camp

The camp development began with putting together a Unity demo, in which a player character (PC) represented by a first-person character controller demonstrates ability to throw destructible fireballs in a simple level containing a terrain, an object, and a skybox. A screenshot of the fireball demo is shown in Figure 1.

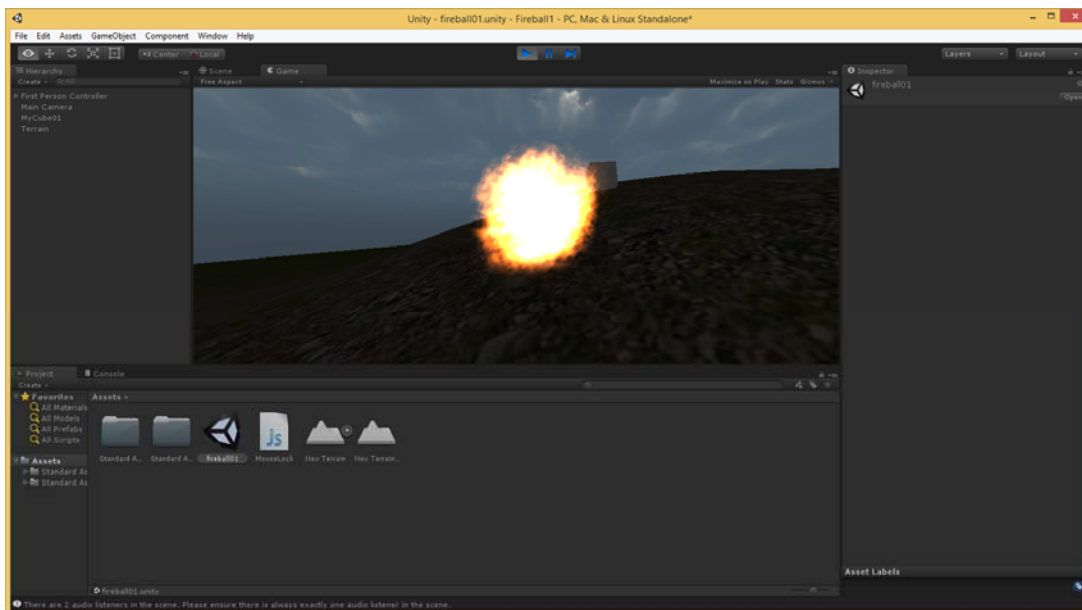


Figure 1. The fireball demo: A PC is about to throw a destructible fireball at an object

The subsequent development of the camp materials on Unity and Autodesk Maya was done primarily using the textbooks by Geig (2014) and Roy (2014), respectively. The part on the basics of game design was based mainly on the authoritative textbook by Adams (2014).

The following promotional statement was developed to advertise the new camp to the potential attendees and their parents.

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Go past game playing to learn the fundamentals of how video games are made. Formulate a game concept, create 3D objects and animations using Autodesk Maya, and import them into Unity, a popular game engine. In Unity, develop a game level and import an animated character into it. Implement basic movement and simple actions of the player character. Let's throw some fireballs and ice bolts! (Warning: Don't try this at home.)

Camp Material

Each camper had access to a lab workstation running Windows 7 with Unity 4.5 and Autodesk Maya 2013 installed.

We issued each camper a 2GB flash drive temporarily, for storage of the work done in the camp. The flash drives were collected at the end of each day's session and, ultimately, at the end of the camp.

Each camper was provided with a collection of free Maya rigs, including

- Stewart and Squirrels by Animation Mentor (2015)
- Simple Bot by Drbal (2015)
- MooM v. 4.0.3 by Ramtin 4.0.0 (2015)
- FishBoy v. 1 by FishBoyProject (2014)
- Morpheus Rig Pack v. 1.0 by Burton (2010)

Finally, a 12-page hardcopy handout entitled "Game Development Camp" was distributed, complete with screenshots and step-by-step instructions, covering the following topics.

1. Tasks (a list)
2. Game (a definition)
3. Game Concept
4. Game Engine
5. Modeling and Animation Software
6. Game Genres, based on Sheldon (2014)
 - a. Game genre classification
 - b. Traditional genres most often made into games
7. 3D Coordinates
8. World Space and Local Space
9. Vectors
10. Cameras
11. Maya and Unity Resources
12. Maya: Creation and Import of 3D Models
13. Unity Topics
 - a. Game Objects and Components
 - b. The Project Dialog
 - c. Layouts
 - d. Assets
 - e. Scenes
 - f. Scene Navigation
 - g. Transforms and Transform Tools
 - h. Importing Models

- i. Textures, Shaders, and Materials
- j. Terrain
- k. Placing Trees and Grass on a Terrain
- l. Skyboxes

Software Needed

Purdue University owned an enterprise license of Autodesk Maya 2013. In addition to that, 25 Unity Pro 4.x licenses were acquired at the cost of \$14,975 (\$599 per license) in March of 2014, with the free upgrade to Unity 5. (Unity 5 was released on March 3, 2015.) These licenses are currently (Spring 2015) used to teach CNIT 399 Introduction to Game Development, a pilot undergraduate course.

Camp Implementation

The camp was held in a lab with 24 workstations and one teaching station connected to a projector. The students and the instructor met from 9 a.m. to 1 p.m., with a short snack break in the middle of each session. One middle school student was allowed to take part in the game development camp, based on her performance in the animation camp. The other campers were high school students, two of them seniors.

Day 1

On the first day of the camp, after the students and the instructor introduced themselves, the campers were told about the 8 tasks that they were about to complete in 5 days in order to make a playable game demo. These tasks corresponded to Topic 1 of the hardcopy handout. Topics 2-6 were then covered in a mixed lecture-discussion format. In particular, we learned about each student's favorite game genre(s). With this student input in mind, the 9 campers were divided into 4 teams, each of which was given the task to formulate a game concept in a Word document. The middle school student was placed on Team 4, the only team that had three members.

Later that day, the teams presented their respective game concepts entitled *Xanthion*, *Flesh and Bones*, *Nassau Island*, and *Leaf Ninjas*. They fielded questions from the fellow campers and the instructor. Some team members began to work on the graphic art for the games. A leaf ninja character design is shown in Figure 2.

Day 2

The second day of the camp saw Topics 7-12 covered and discussed. Students viewed Maya tutorial videos and played with free Maya rigs. The instructor demonstrated Maya ball animation to illustrate the important concepts of squash, stretch, and anticipation. Students began to work on 3D models for their game projects. Figure 3 shows the Morpheus rig transformed into a Leaf Ninja.

Day 3

The instructor began Day 3 by showing Angry Bots, a demo that came with Unity, and let the students play to get the taste of this mini-game and appreciate the game engine's capabilities. The Unity topics

were then covered, including import of models from Maya and the Unity asset store, so that the students could begin to work on level design for their games. So they did. The instructor fielded questions and demonstrated import of yesterday's ball animation into Unity.



Figure 2. Sample concept art: Leaf ninja character design by Masha Guseva (Team 4).

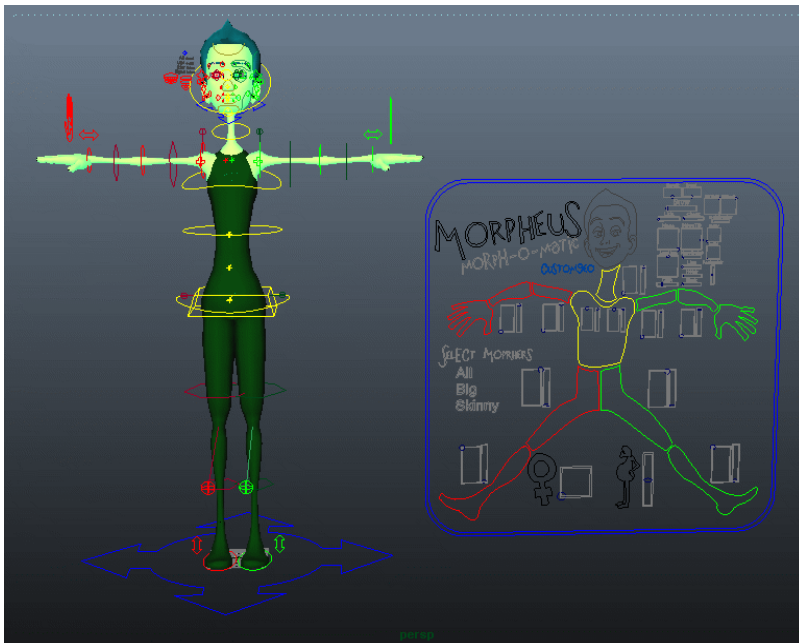


Figure 3. Morpheus rig for Maya transformed into the leaf ninja character by Masha Guseva.

Day 4

The campers learned basic Unity scripting from the fireball demo. Two of the teams also benefited from the gun shot tutorial by Ray (2010), due to the first-person shooter (FPS) nature of the games they had decided to make. Students worked actively on game scripting for their games. One of the teams experimented with the third-person character controller.

Day 5

The first half of the last day of the camp allowed all four teams to complete their playable game demos. Two campers out of 9 did not attend the camp on Day 5, due to an illness and a prior arrangement to go to another event. As a result, two campers finished their teams' projects alone. Team 4 changed the game concept and developed a demo for a 'nutty' game named *Squirrel*, instead of *Leaf Ninjas*. All four game demos used the first-person character controller.

After the snack break, the teams showed their playable game demos to the judges of 7 faculty and staff members of Purdue University College of Technology Columbus. (The authors of the paper did not judge.) The judges were instructed to use the following game evaluation criteria:

1. Game concept
2. Level design
3. Character design and animation
4. Game programming/scripting
5. Presentation quality
6. Teamwork
7. Overall fun

The judges decided to adapt the multi-criterial scoring system used in the LEGO Robotics camp. Figures 4, 5, and 6 show screenshots from *Xanthion* (1st place), *Nassau Island* (3rd place), and *Flesh and Bones* (4th place). The winning team was formed by the two seniors.

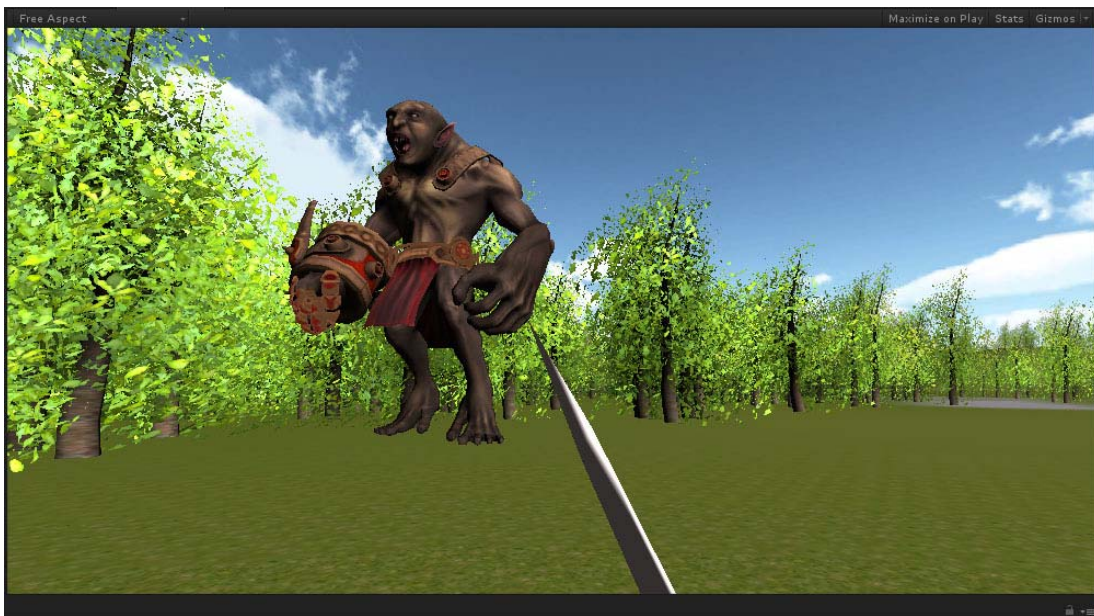


Figure 4. Screenshot from *Xanthion* (Team 2): Will the troll spot me? (He will.)



Figure 5. Screenshot from *Nassau Island* (Team 1): Roaming the beach with a gun that shoots.



Figure 6. Screenshot from *Flesh and Bones* (Team 3): Zombies attack! The gun won't shoot.

Evaluation of Camps Success

Beginning with the first camp delivered in 2011 and detailed at the 2012 ASCUE conference we have three criteria that we would like to use to evaluate the camp's success. We still think the criteria is appropriate. First, did the campers have a good time and learn something in their time at Purdue? Second, are we able to get people to realize that Purdue is in their community? Third, will this camp help in recruiting students?

In terms of the first criteria, did the campers have a good time and learn something in their time at Purdue? The answer is yes. Evaluations of the Computer Animation Camp given to parents each year seem to bear this out. Parents and campers seem very pleased and the camp is at or near capacity each year it has been offered. The Game Development Camp for the first session drew nine campers. The overall reaction to the camp by parents and campers was favorable. The lower numbers could be attributed to the fact that this was the first year Purdue University handled advertising and registration (previously it was handled by the Columbus Center for Teaching and Learning (CTL)) and there were a few glitches in the new system. With this being the initial offering the Game Development Camp it did not have the word of mouth advertising that the Computer Animation Camp did.

In terms of the second criteria, making people in the Columbus area aware that Purdue University is there. This is hard to determine. Parents have heard of the animation camp and now hopefully with the game development camp but the question is do they realize that this is THE Purdue University and not IUPUC. Like recruiting, there is not just one thing that will get results, so we hope it will make a difference and keep trying. Last year was the first year the camps were run strictly by Purdue and through the Purdue website. If the bugs can get ironed out that can only help.

The third criteria, recruiting new students is probably still too early to tell. The oldest of the animation campers are in high school now. It will take a few years with the new strategy of animation and game development camps to see if we can make a difference.

Future Plans

We plan to do a second offering of both camps this summer. The main goals for this summer is to make sure that both camps are well publicized so we can reach full or near full capacity for both camps. We hope to have more advertising in the local paper. One of the original goals of the animation camp was to attract more females into our program and in the past we have had good female representation. For this year we plan to promote that even more. Each local middle school and high school will be given one free seat in the camp to be awarded to a female at that school.

Conclusions

We plan to have a second offering of both camps this summer. We hope the camps will continue to grow in students and publicity in the Columbus area. Based on the success of the Computer Animation Camp we feel like it offers an excellent recruiting tool for years to come.

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